

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Jeffcoate
Serial No: 10/723,054
Filed: November 25, 2003
Group Art Unit: 1746
Examiner: Tony Sheng Hsiang Chuo
Confirmation No. 7777
For: METHODS AND DEVICES FOR HEATING OR COOLING
FUEL CELL SYSTEMS

APPEAL BRIEF

1. THE REAL PARTY IN INTEREST

The real party in interest of this appeal is Honeywell International Inc.

2. RELATED APPEALS AND INTERFERENCES

Applicant knows of no related patent applications or patents under any appeal or interference proceeding.

3. STATUS OF CLAIMS

Claims 12 through 25 are pending and are the claims subject to this appeal. Claims 1 through 11 were previously cancelled. The status of pending claims 12 through 25 are as follows.

Claims 12, 13, 16-20, 24 and 25 are rejected under 35 U.S.C. §103(a) as being unpatentable over JP 2002-141077, to Shirai, hereinafter referred to as Shirai, and in view of JP 06-318736, to Kaneko, hereinafter referred to as Kaneko.

Claims 14 and 22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shirai in view of Kaneko and in further view of U.S. Patent No. 5,576,512, to Doke, hereinafter referred to as Doke.

Claims 15 and 23 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shirai in view of Kaneko and in further view of U.S. Patent No. 5,753,383, to Cargnellie et al., hereinafter referred to as Cargnellie et al.

Claim 21 is rejected under 35 U.S.C. §103(a) as being unpatentable over Shirai in view of Kaneko and in further view of U.S. Patent Publication No. 2003/0044662, to Walsh, hereinafter referred to as Walsh.

4. STATUS OF AMENDMENTS

Applicant submits that no amendments were filed subsequent to the Final Office Action dated August 30, 2007.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 12 is directed towards a method for controlling a temperature of a fuel cell assembly (21, 40, 50 and 80), as shown in the exemplary embodiments of Figs. 2 through 8B. The method includes measuring the temperature of the fuel cell assembly (21, 40, 50 and 80) in contact with a thermoelectric layer (28, 60 and 70). See paragraphs 67 and 56. The method further includes adjusting a voltage of a power source in response to the measured temperature to heat or cool the fuel cell assembly (21, 40, 50, 80) in contact with the thermoelectric layer (28, 60 and 70). See paragraphs 59, lines 6 – 13; 62, lines 1-2; and 63, line 1. The method further includes the thermoelectric layer comprises one or more thermoelectric devices (62 and 72) in electrical communication with the power source (see paragraphs 57 and 59, lines 6-9) and wherein a heat distribution of the fuel cell assembly is substantially uniform. See paragraphs 73 and 75 and Fig. 8B.

Dependent claim 13 recites that the thermoelectric devices are Peltier devices. See paragraph 62, lines 1-2.

Dependent claim 14 recites that the power source is a battery. See paragraph 66, lines 1-3.

Dependent claim 15 recites that the power source is the fuel cell assembly (21, 40, 50 and 80). See paragraph 66, line 3.

Dependent claim 16 recites that the fuel cell assembly (21, 40, 50 and 80) is selected from the group consisting of proton exchange membrane fuel cell, phosphoric acid fuel cell, molten carbonate fuel cell, solid oxide fuel cell and alkaline fuel cell. See paragraphs 51 and 50.

Dependent claim 17 recites that the method further comprises contacting a periphery of the fuel cell assembly (21, 40, 50 and 80) with a heat sink. See paragraph 70.

Independent claim 18 is directed towards a method of controlling a temperature of a fuel cell stack (20 and 30), as shown in the exemplary embodiments of Figs. 2 and 3. The method includes providing one or more thermoelectric layers (28, 60 and 70) in between adjacent fuel cell assemblies (21, 40, 50 and 80) in the fuel cell stack (20 and 30). See paragraph 60. Each thermoelectric layer (28, 60 and 70) is adjacent to a fuel cell assembly (21, 40, 50 and 80) and each thermoelectric layer (28, 60 and 70) is in contact with at least one fuel cell assembly (21, 40, 50 and 80). See paragraph 60. The thermoelectric layers (28, 60 and 70) each comprise one or more thermoelectric devices (62 and 72) and each thermoelectric device (62 and 72) in electrical communication with a power source. See paragraph 54-57. The method further includes providing a heat sink in thermal contact with a periphery of the fuel cell stack (20 and 30). See paragraph 70. The method further includes measuring the temperature of fuel cell assemblies (21, 40, 50 and 80) adjacent to the thermoelectric layers (28, 60 and 70) at one or more locations across the fuel cell assemblies (21, 40, 50 and 80). See paragraph 67 and Figs. 6B and 7B. The method also includes adjusting the voltage of the power source in response to the measured temperatures (see paragraph 68) to heat or cool the temperature of the at least one fuel cell assembly (21, 40, 50 and 80) in contact with the thermoelectric layer (28, 60 and 70) (see paragraph 57 and 58) at the one or more locations of the fuel cell stack (20 and 30) (see paragraph 67 and 68), wherein a heat distribution of the fuel cell assembly (21, 40, 50 and 80) is substantially uniform (see paragraph 75 and Fig. 8B).

Dependent claim 19 recites that each thermoelectric layer further comprises one or more temperature-sensing devices (28, which in this configuration includes both thermoelectric device and temperature-sensing device) each associated with one or more thermoelectric devices (62 and 72) (see paragraph 59, lines 6-8) and connected via control circuitry to the power sources to which the associated thermoelectric devices (62 and 72) are connected. See paragraph 59, lines 8-11.

Dependent claim 20 recites that the thermoelectric devices are Peltier devices. See paragraph 62, lines 1-2.

Dependent claim 21 recites that the temperature sensing devices are thermocouples

(64 and 74). See paragraph 67, line 5.

Dependent claim 22 recites that the power source is a battery. See paragraph 66, lines 1-3.

Dependent claim 23 recites that the power source is a fuel cell (21, 40, 50 and 80). See paragraph 66, line 3.

Dependent claim 24 recites that the fuel cell assembly (21, 40, 50 and 80) comprises a plurality of stacked fuel cells (20 and 30) selected from the group consisting of a proton exchange membrane fuel cell, a phosphoric acid fuel cell, a molten carbonate fuel cell, a solid oxide fuel cell, and an alkaline fuel cell. See paragraph 51 and 50.

Dependent claim 25 recites that the temperature is substantially uniform across the fuel cell assembly (21, 40, 50 and 80). See paragraph 75, Fig. 8.

6. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The Examiner's rejection of claims 12, 13, 16-20, 24 and 25 under 35 U.S.C. §103(a) as being unpatentable based upon Shirai and in view of Kaneko.

The Examiner's rejection of claims 14 and 22 under 35 U.S.C. §103(a) as being unpatentable based upon Shirai, in view of Kaneko and in further view of Doke.

The Examiner's rejection of claims 15 and 23 under 35 U.S.C. §103(a) as being unpatentable based upon Shirai, in view of Kaneko and in further view of Cargnelli et al.

The Examiner's rejection of claim 21 under 35 U.S.C. §103(a) as being unpatentable based upon Shirai, in view of Kaneko and in further view of Walsh.

7. ARGUMENTS

A. The Examiner's rejection of claims 12, 13, 16-20, 24 and 25 under 35 U.S.C. §103(a) as being unpatentable based upon Shirai and in view of Kaneko is improper.

Claims 12, 13, 16-20, 24 and 25 stand or fall together as a group.

Summary of Arguments:

Applicant requests that the obviousness rejections of claims 12, 13, 16-20, 24 and 25 be reversed on the following grounds:

- I) Each of the prior art items relied upon by the Examiner, do not teach each and every claim feature of claims 12, 13, 16-20, 24 and 25 in contravention to *In re Royka*, 180 USPQ 580 (CCPA 1974).
- II) The prior art lacks motivation to make the suggested modification, used for rejecting claims 12, 13, 16-20, 24 and 25, for the following reasons: a) the suggested modification would render the prior art invention inoperable for its intended purpose; b) the suggested modification would change the principle of operation of the prior art invention; and c) the cited references teach away from each other and Applicant's claimed invention.

First Argument

Each of the cited prior art items fail to disclosure: i) adjusting a voltage of a power source in response to a measured temperature to heat or cool a fuel cell assembly in contact with a thermoelectric layer, and ii) wherein a heat distribution of the fuel cell assembly is substantially uniform, as required by claims 12, 13, 16-20, 24 and 25.

Controlling Law of First Argument

Manual of Patent Examining Procedure section §2142 recites that "the prior art reference (or references when combined) must teach or suggest all the claim limitation." Also see *In re Royka*, 180 USPQ 580 (CCPA 1974) and *In re Wilson*, 165 USPQ 494

(CCPA 1970). Also, with respect to inherency, “to serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is **necessarily present** in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.” *Continental Can Co. USA v. Monsanto Co.*, 20 USPQ 2d 1746, 1749 (Fed. Cir. 1991) (emphasis added).

The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007) noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Federal Circuit has also stated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006).

Background and First Argument

Each of claims 12 through 17 include explicitly, or through dependency, “adjusting the voltage of a power source in response to the measured temperature to heat or cool the fuel cell assembly in contact with the thermoelectric layer. Claims 18 through 25 include explicitly, or through dependency, “adjusting the voltage of the power source in response to the measured temperatures to heat or cool the temperature of the at least one fuel cell assembly in contact with the thermoelectric layer at the one or more locations of the fuel cell stack”. Accordingly, claims 12, 13, 16-20, 24 and 25 require that voltage of a power source is adjusted in response to a measured temperature to heat or cool the fuel cell assembly. More simply stated, claims 12, 13, 16-20, 24 and 25 require heating or cooling of a fuel cell through a power source.

The Final Office Action acknowledges, “Shirai does not expressly teach adjusting a voltage of a power source in response to the measured temperature to heat or cool the fuel cell assembly”. Final Office Action, p. 3, lines 5-6. To account for the shortcomings of Shirai, the Final Office action asserts modification of Shirai to include the features of Kaneko, specifically, passing current through a Peltier thermoelectric element to heat or

cool a temperature controlled object makes up for the deficiency of Shirai. See Final Office Action, p. 3, lines 8-15, p. 3, line 20 – p. 4, line 3. Applicant respectfully disagrees with the rejection to claims 12, 13, 16-20, 24 and 25 as even the combination of Shirai and Kaneko still fail to teach: heating or cooling a fuel cell through a power source, or adjustment of a voltage of a power source to heat or cool a fuel cell, or still further adjustment of a voltage of a power source based upon a measured temperature to heat or cool a fuel cell.

First, Applicant notes that thermoelectric conversion element of Shirai is not configured to heat or cool a fuel cell as the thermoelectric conversion element indicated by the Final Office Action is instead designed to generate current as a result of heat radiating from the fuel cell. See Shirai translation, paragraph 35, Effect of the Invention. Nor does Shirai teach or suggest a thermoelectric conversion element even in communication with a power source. Accordingly, there is little to no basis to assert that Shirai teaches or suggests adjustment of a voltage of a power source based upon a measured temperature to heat or cool a fuel cell.

Further, notwithstanding the lack of motivation to combined the references as described herein, Kaneko does not make up for the deficiencies of Shirai as Kaneko also fails to teach or suggest any component configured to heat or cool a fuel cell. Accordingly, Kaneko also does not teach or suggest adjustment of a voltage of a power source based upon a measured temperature, or otherwise, to heat or cool a fuel cell.

For the above reasons, the combination of Shirai and Kaneko fail to teach all of the claim features of claims 12, 13, 16-20, 24 and 25 since they do not teach or suggest heating or cooling a fuel cell, particularly through adjustment of a voltage, regardless of whether it is based upon a measured temperature or otherwise. Applicant notes “all words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 165 USPQ 494, 496 (CCPA 1970). Accordingly, the rejections of claims 12, 13, 16-20, 24 and 25 are improper as a prima facie case of obviousness has yet to be presented and the burden still remains with the Examiner to present such prima facie case, should

one exist.¹

Each of claims 12, 13, 16-20, 24 and 25 include explicitly, or through dependency, “wherein a heat distribution of the fuel cell assembly is substantially uniform”. Without any additional evidence, the Final Office Action conclusively assert “it is also inherent that the heat distribution of the fuel cell assembly will be substantially uniform as a result of heating or cooling the fuel cell stack by using the Peltier device”. Final Office Action, p. 3, lines 17-19.

As noted above in *Continental Can Co. USA*, for a claim feature to be inherent evidence must be presented, or even exist, to make clear that the missing descriptive matter, in this case uniform heat distribution, is “necessarily present” in the thing described in the reference. As both Shirai and Kaneko fail to teach or suggest actively heating or cooling the fuel cell, as described above, there is no evidence, or even indication, that uniform heat distribution of the fuel cell assembly is present, let alone must be “necessarily present”. Also, as stated in the Office Action Response dated June 20, 2007, the mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish inherency. *In re Oelrich*, 212 USPQ 323, 326 (CCPA 1981). Further, obviousness cannot be predicated on what is unknown. *In re Spormann*, 150 USPQ 449, 452 (CCPA 1966).

For the above reasons, the combination of Shirai and Kaneko fail to teach all of the claim features of claims 12, 13, 16-20, 24 and 25 since they do not teach or suggest a heat distribution of the fuel cell assembly being substantially uniform. For this reason alone, Applicant believes that the rejections to claims 12, 13, 16-20, 24 and 25, as being obvious under 35 U.S.C. §103(a), are improper.

¹ The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness. MPEP §2142.

Second Argument

The prior art lacks motivation to modify Shirai with the teachings of Kaneko to formulate obviousness rejections of claims 12, 13, 16-20, 24 and 25 as: A) the suggested modification would render Shirai inoperable for its intended purpose; B) the suggested modification would change the principle of operation of Shirai; and C) Shirai and Kaneko teach away from each other and Applicant's claimed invention.

Controlling Law of Second Argument

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. *In re Kahn*, 78 USPQ2d 1329, 1335 (Fed. Cir. 2006). However, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984). Or, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 123 USPQ 349 (CCPA 1959). Also, it is improper to combine references where the references teach away from their combination. *In re Grasselli*, 218 USPQ 769, 779 (Fed. Cir. 1983).

Background and Second Argument

Each of claims 12, 13, 16-20, 24 and 25 were rejected by the Final Office Action based upon the combination of Shirai and Kaneko. Specifically, as described above, the Final Office Action asserts that the fuel cell of Shirai can be modified to include the thermoelectric element of Kaneko. Applicant respectfully disagrees.

Applicant presents that the modification of Shirai to include the thermoelectric element of Kaneko would render the Shirai system unsatisfactory for its intended purpose in contravention to *In re Gordon*. This is because the thermoelectric element of Shirai operates to generate electricity through the use of the thermoelectric element as opposed to

expelling energy through the thermoelectric element of Kaneko. For example, the thermoelectric device of Shirai “transforms heat energy into electrical energy”. Shirai translation, Effects of the Invention. The purpose of this configuration is to form “a fuel cell of high energy utilization efficiency by utilizing thermal energy as well generated [sic] by electrochemical reaction.” Shirai translation, Problem To Be Solved (emphasis added). Also see Effect of the Invention. In contrast, Kaneko utilizes energy to cause heating of a member, though no indication of a fuel cell is provided. Simply put, Shirai utilizes heat to form an electrical current while Kaneko utilizes electrical current to form heat.

Accordingly, the modification of Shirai pursuant to the suggestions of the Final Office Action would render Shirai unsatisfactory for its intended purpose to provide a fuel cell of high energy utilization since the thermoelectric device of Kaneko would not only fail to generate electricity, but more so, cause depletion of electricity.

Applicant also notes that the suggested modification would change the principle of operation of the prior art invention being modified in contravention to *In re Ratti*. As mentioned above, the modification of Shirai to include the thermoelectric element of Kaneko would decrease the ability of the Shirai device to generate electricity. More so, the usage of the thermoelectric device of Kaneko would change the principle of operation of Shirai as no longer is the system of Shirai generating electricity through the heat formed by the fuel cell. Instead, through the suggested modification of the Final Office Action, energy will be expelled to generate yet additional heat to the system. To date, no reasoning has been provided for adding heat to the system of Shirai in view of the operation of Shirai.

Accordingly, the modification of Shirai, pursuant to the suggestions of the Final Office Action would also change the principle of operation of Shirai to utilize heat to generate electricity.

Applicant further notes that it is improper to combine references where the references teach away from their combination, pursuant to *In re Grasselli*. As mentioned above, Shirai teaches the utilization of a thermoelectric element to transform heat into

electricity while Kaneko teaches the utilization of a thermoelectric element to transform electricity into heat. Applicant presents that it would be improper to modify Shirai to include the thermoelectric element of Kaneko since the reference teaches the opposite, or inverse, use of a thermoelectric element and hence teach away from their combination.

For all three of the above reasons the prior art lacks motivation to combine the thermoelectric element of Kaneko with the system of Shirai to teach the features of claims 12, 13, 16-20, 24 and 25, as suggested by the Final Office Action. For these reasons alone, Applicant believes that the rejections to claims 12, 13, 16-20, 24 and 25 as being obvious under 35 U.S.C. §103(a) is improper.

B. The Examiner's rejection of claims 14 and 22 under 35 U.S.C. §103(a) as being unpatentable based upon Shirai, in view of Kaneko and in further view of Doke is improper.

Claims 14 and 22 stand or fall together as a group. Claims 14 and 22 are dependent upon claims 12 and 18, respectively. Accordingly, the arguments presented with respect to claims 12, 13, 16-20, 24 and 25 are herein incorporated by reference.

The combination of Shirai and Kaneko fail to teach each and every claim feature of claims 14 and 22 in contravention to *In re Royka*, 180 USPQ 580 (CCPA 1974). Specifically, the combination of Shirai and Kaneko fail to teach: i) adjusting a voltage of a power source in response to a measured temperature to heat or cool a fuel cell assembly in contact with a thermoelectric layer, and ii) wherein a heat distribution of the fuel cell assembly is substantially uniform, as required by claims 14 and 22 through their dependency of claims 12 and 18, respectively. The addition of Doke does not rectify these deficiencies as Doke does not appear to discuss any use of a thermoelectric device with a fuel cell.

Also, the prior art lacks motivation to make the suggested modification to combine Shirai and Kaneko used for rejecting claims 14 and 22, for the following reasons: a) the suggested modification would render the prior art invention inoperable for its intended

purpose; b) the suggested modification would change the principle of operation of the prior art invention; and c) the cited references teach away from each other and Applicant's claimed invention. The addition of Doke does not rectify these deficiencies as Doke does not appear to discuss any use of a thermoelectric device with a fuel cell.

C. The Examiner's rejection of claims 15 and 23 under 35 U.S.C. §103(a) as being unpatentable based upon Shirai, in view of Kaneko and in further view of Cargnelli et al. is improper.

Claims 15 and 23 stand or fall together as a group. Claims 15 and 23 are dependent upon claims 12 and 18, respectively. Accordingly, the arguments presented with respect to claims 12, 13, 16-20, 24 and 25 are herein incorporated by reference.

The combination of Shirai and Kaneko fail to teach each and every claim feature of claims 15 and 23 in contravention to *In re Royka*, 180 USPQ 580 (CCPA 1974). Specifically, the combination of Shirai and Kaneko fail to teach: i) adjusting a voltage of a power source in response to a measured temperature to heat or cool a fuel cell assembly in contact with a thermoelectric layer, and ii) wherein a heat distribution of the fuel cell assembly is substantially uniform, as required by claims 15 and 23 through their dependency of claims 12 and 18, respectively. The addition of Cargnelli et al. does not rectify these deficiencies as Cargnelli et al. does not teach adjusting a voltage of a power source to heat or cool a fuel cell, let alone in response to a measured temperature. Further, Cargnelli et al. fails to teach uniform heat distribution across a fuel cell.

Also, the prior art lacks motivation to make the suggested modification to combine Shirai and Kaneko used for rejecting claims 15 and 23, for the following reasons: a) the suggested modification would render the prior art invention inoperable for its intended purpose; b) the suggested modification would change the principle of operation of the prior art invention; and c) the cited references teach away from each other and Applicant's claimed invention. The addition of Cargnelli et al. does not rectify these deficiencies as Cargnelli et al. appears to be somewhat similar to Shirai in that the Cargnelli et al. teaches

the use of a thermoelectric element or device to generate electricity based upon heat.

D. The Examiner's rejection of claim 21 under 35 U.S.C. §103(a) as being unpatentable based upon Shirai, in view of Kaneko and in further view of Walsh is improper.

Claim 21 is dependent upon claim 18. Accordingly, the arguments presented with respect to claims 12, 13, 16-20, 24 and 25 are herein incorporated by reference.

The combination of Shirai and Kaneko fail to teach each and every claim feature of claim 21 in contravention to *In re Royka*, 180 USPQ 580 (CCPA 1974). Specifically, the combination of Shirai and Kaneko fail to teach: i) adjusting a voltage of a power source in response to a measured temperature to heat or cool a fuel cell assembly in contact with a thermoelectric layer, and ii) wherein a heat distribution of the fuel cell assembly is substantially uniform, as required by claim 21 through its dependency of claim 18. The addition of Walsh does not rectify these deficiencies as Walsh does not teach adjusting a voltage of a power source to heat or cool a fuel cell, let alone in response to a measured temperature. Further, Walsh fails to teach uniform heat distribution to a fuel cell.

Also, the prior art lacks motivation to make the suggested modification to combine Shirai and Kaneko used for rejecting claim 21, for the following reasons: a) the suggested modification would render the prior art invention inoperable for its intended purpose; b) the suggested modification would change the principle of operation of the prior art invention; and c) the cited references teach away from each other and Applicant's claimed invention. The addition of Walsh does not rectify these deficiencies as Walsh cannot rectify the fact that Shirai and Kaneko teach away from each other.

8. CONCLUSION

In view of the foregoing arguments, Applicant respectfully submits that the pending claims are novel and unobvious. Further, a reversal of the rejections of record, or such recommendation or relief as equity may require, is respectfully requested. Please charge any costs incurred in the filing of this Appeal Brief, along with any other costs, to Deposit Account No. 06-1130.

Respectfully Submitted,

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CLAIMS APPENDIX

12. A method for controlling a temperature of a fuel cell assembly, the method comprising:

measuring the temperature of the fuel cell assembly in contact with a thermoelectric layer; and

adjusting a voltage of a power source in response to the measured temperature to heat or cool the fuel cell assembly in contact with the thermoelectric layer, wherein the thermoelectric layer comprises one or more thermoelectric devices in electrical communication with the power source and wherein a heat distribution of the fuel cell assembly is substantially uniform.

13. The method according to claim 12, wherein the thermoelectric devices are Peltier devices.

14. The method according to claim 12, wherein the power source is a battery.

15. The method according to claim 12, wherein the power source is the fuel cell assembly.

16. The method according to claim 12, wherein the fuel cell assembly is selected from the group consisting of proton exchange membrane fuel cell, phosphoric acid fuel cell, molten carbonate fuel cell, solid oxide fuel cell and alkaline fuel cell.

17. The method according to claim 12, further comprising contacting a periphery of the fuel cell assembly with a heat sink.

18. A method of controlling a temperature of a fuel cell stack, comprising:
- providing one or more thermoelectric layers in between adjacent fuel cell assemblies in the fuel cell stack, wherein each thermoelectric layer is adjacent to a fuel cell assembly, wherein each thermoelectric layer is in contact with at least one fuel cell assembly and wherein the thermoelectric layers each comprise one or more thermoelectric devices, each thermoelectric device in electrical communication with a power source;
 - providing a heat sink in thermal contact with a periphery of the fuel cell stack;
 - measuring the temperature of fuel cell assemblies adjacent to the thermoelectric layers at one or more locations across the fuel cell assemblies; and
 - adjusting the voltage of the power source in response to the measured temperatures to heat or cool the temperature of the at least one fuel cell assembly in contact with the thermoelectric layer at the one or more locations of the fuel cell stack, wherein a heat distribution of the fuel cell assembly is substantially uniform.
19. The method according to claim 18, wherein each thermoelectric layer further comprises one or more temperature-sensing devices each associated with one or more thermoelectric devices and connected via control circuitry to the power sources to which the associated thermoelectric devices are connected.
20. The method according to claim 18, wherein the thermoelectric devices are Peltier devices.

21. The method according to claim 19, wherein the temperature sensing devices are thermocouples.
22. The method according to claim 18, wherein the power source is a battery.
23. The method according to claim 18, wherein the power source is a fuel cell.
24. The method according to claim 18, wherein the fuel cell assembly comprises a plurality of stacked fuel cells selected from the group consisting of a proton exchange membrane fuel cell, a phosphoric acid fuel cell, a molten carbonate fuel cell, a solid oxide fuel cell, and an alkaline fuel cell.
25. The method according to claim 18, wherein the temperature is substantially uniform across the fuel cell assembly.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

Applicant is not aware of any related proceedings for this patent application.